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| APPLICATION NO | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO | CONFIRMATION NO |
|----------------|-------------|----------------------|--------------------|-----------------|
| 10 033,394     | 12 28 2001  | Seong-jae Lee        | 2013p006           | 8538            |

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EXAMINER

NGUYEN, KHIEM D

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|          | 2823         |

DATE MAILED: 06 16 2003

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                            |                  |
|------------------------------|----------------------------|------------------|
| <b>Office Action Summary</b> | Application No.            | Applicant(s)     |
|                              | 10/033,394                 | LEE ET AL.       |
|                              | Examiner<br>Khiem D Nguyen | Art Unit<br>2823 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 08 April 2003.

2a) This action is **FINAL**.      2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-5 and 7-20 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-5 and 7-20 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 28 December 2001 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some \* c) None of:  
1. Certified copies of the priority documents have been received.  
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

|  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s) _____   |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other _____                                     |

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-5 and 7-20 have been considered but are moot in view of the new ground(s) of rejection.

### ***New Grounds of Rejection***

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5 and 7-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Byun et al. (U.S. Patent 5,599,734) in view of Kroner et al. (IEEE 2000).

Byun teaches a method of fabricating an integrated circuit comprising (col. 3, line 29 to col. 4, line 17 and FIGS. 2(a-c)):

forming a diffusion barrier layer pattern (22, 23) on a semiconductor substrate 21 (col. 3, lines 29-32);

forming a SOG layer 24 containing impurities, including one of a p-type impurity and an n-type impurity on the entire surface of the semiconductor substrate wherein the SOG layer is formed by spin-coating and densifying a liquid silicate glass or CVD including P and B doping elements (col. 3, lines 33-57 and FIG. 2b) and wherein the ratio of the thickness of the SOG layer to the height of a gate electrode constituting the gate pattern is between 1:1.5 and 1:10; and

diffusing the impurity ions contained in the SOG layer into the semiconductor substrate by a solid phase diffusion method using rapid thermal annealing at a temperature of 800-1100 °C (col. 4, line 17) to form shallow junctions having a LDD region self-aligned underneath both sidewalls of the gate pattern and a highly doped source/drain region 25 adjacent to the LDD region (col. 3, lines 38-40) wherein the shallow junctions having a doping depth of 50nm or less (col. 4, lines 26-28).

Byun fails to explicitly disclose additionally implanting impurity ions into portions of the SOG layer formed on the diffusion barrier layer and the semiconductor substrate by a plasma ion implantation method to increase the concentration of impurities in the SOG layer using a plasma ion implanter including a Plasma Immersion Ion Implanter (PIII) and an Ion Shower Implanter (ISI) as recited in present claims 1, 4, 11 and 15.

Kroner et al. disclose (page 476) additionally implanting impurity ions into the SOG layer by a plasma ion implantation method using a plasma ion implanter including an Ion Shower Implanter (ISI). It would have been obvious to one of ordinary skill in the art of making semiconductor devices to combine the teaching of Byun and Kroner to enable the process of additionally implanting impurity ions into portions of the SOG layer formed on the diffusion barrier layer and the semiconductor substrate by a plasma ion implantation of Byun to be performed and furthermore to increase the concentration of impurities in the SOG layer because it is a doping method for high dose and low energy implants (page 476, Abstract).

Byun fails to explicitly disclose the ranges for the maximum impurity implantation concentration of the SOG layer and doping concentration of the shallow junctions as recited present claims 5, 10, 16 and 20.

However, there is no evidence indicating that the ranges for the maximum impurity implantation concentration of the SOG layer and doping concentration of the shallow junctions are critical and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05. Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

***Response to Amendment***

***Response to Arguments***

Applicant's arguments with respect to claims 1-5 and 7-20 have been considered but are moot in view of the new ground(s) of rejection.

In response to applicant's argument that Byun fails to teach forming a SOG layer containing impurities, including one of a p-type impurity and an n-type impurity on the entire surface of the semiconductor substrate. Byun discloses forming a SOG layer (FIG. 2b, 24) having a first conductivity type impurity (n-type impurity such as phosphorous (P)) and a second conductivity impurity (p-type impurity such as Boron (B)) of a higher

concentration than that of the first conductivity impurity (col. 3, lines 33-57) over the entire surface of the semiconductor substrate (FIG. 2b, 21).

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D Nguyen whose telephone number is (703) 306-0210. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-9179 for regular communications and (703) 746-9179 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

K.N.  
June 5, 2003

